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ABSTRACT

A detailed analysis of 76 major heuristic strategies or processes is provided in this supplementary text to the course, Tools for Change. Each strategy is conceptualized as a pair of active verbs which represent alternative, although not necessarily opposite, approaches to problem-solving. Some examples are: a) commit-defer; b) record-recall; c) assume-question; and d) expand-reduce. For purposes of this text, the strategies are grouped into the following eight categories: 1) master strategies; 2) strategies for set manipulation; 3) strategies of involvement; 4) strategies for manipulating information; 5) strategies for information retrieval; 6) strategies for dealing with the future; 7) strategies for physical manipulation; and 8) metaheuristics. The powers and limitations of each individual stragegy are discussed and exercises for using them are suggested. (PB)

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TOOLS FOR CHANGE

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INTRODUCTION

One factor that appears constant in our society is change. . .changing values, mores, technology, political theories - the world. What do we have to offer our children or each other, that will be useful in a future that we cannot even predict. The tools we fashion cannot be physical; technology is changing at a rapid rate. Nor can they be concepts or facts, for these change as new perceptions emerge. The tool then, that we would like to offer is process - process to confront, relate to, modify, the facts and the technology.

TOOLS FOR CHANGE

Interaction Associates, Inc. has been developing and testing a basic course, Tools For Change, which will assist students to become aware of and learn how to use process to help them become productive, self-confident, and flexible in the solving of problems.

By becoming conscious (aware) of the processes (strategies) he uses to resolve a problem or win a game, the student can then apply these same processes in other situations (transfer). These processes range from highly logical ones (plan/predict, simulate/test) to much more intuitive ones (dream/imagine).

It is not enough, however, to simply be able to identify the seventy odd processes that cover the range of problem solving. It is necessary to have a wide variety of experiences to encourage students to talk about (externalize) the methods they are using. By sharing their experiences and individual problem solving strategies, they will naturally come to an awareness of a wider range of strategies available to them.

We believe that a student should spend a relatively small percentage of his class time 'thinking about thinking', although this time is critical for teaching awareness. Most of his time should be spent on problem solving itself. We believe that it would be more effective to spread the same amount of time focusing on process throughout the day as opposed to concentrating it all in one hour.

We also believe that the relevancy of the problem is important. The more meaningful the problem is to the student, the more willing he is to learn new approaches to solving it, and the more likely he is to find value in process awareness.

Tools For Change does not profess to offer a guaranteed, sure-fire method of problem solving. What we do hope to do is better the odds of achieving a viable solution to a problem by maximizing a student's process awareness and process implementation.

This publication serves as a supplementary text, focusing on the strategies themselves as conceptual tools. A more complete exploration of process theory, research and use can be found in **Tools For Change, Second Edition**, which is available through Interaction Associates, 149 9th Street, San Francisco.

PROCESS VOCABULARY

Just as we use physical tools for physical tasks, we employ conceptual tools for conceptual tasks. To familiarize yourself with a tool, you may experiment with it, test it in different situations, and evaluate its usefulness. The same method can be applied to conceptual tools. Our ability as thinkers is dependent on our range and skill with our own tools. The tools we use conceptually are what we have defined as strategies, and they are part of what we call our process repertoire.

It is obvious that you already have a process repertoire if you are alive and thinking. But are you aware of your process? Do you know its uses and limitations? It is difficult to explore or expand your process repertoire unless you have a basic language and vocabulary for describing these processes.

That is what this text essentially offers; a glossary of strategies defining the most common strategies, and offering some information and practice in using them.

The classification in the glossary is arbitrary. Developers of Tools For Change simply documented as many different approaches to problems as possible, and searched for some common denominators. The labels were chosen for their simplicity. The pairs of strategies are simple, active verbs with meanings that are commonly accepted in Webster's Dictionary. The pairs are not necessarily opposites, but represent two approaches to a certain type of problem. Problem solving can be seen as a constant balancing process between strategies that approach a problem from different directions, and our classification by pairs reflects this balance.

We have included a game or exercise for each strategy. These exercises offer an experience using the strategy, and provide a useful way to demonstrate and observe process. However, experiencing a strategy only in game context is not enough to enable a person to fully understand its powers and limitations. Transfer can only occur if a connection can be made between use of the strategies in games and use of them in real life.

PROCESS APPLICATION

Ideally you should familiarize yourself with all of the strategies to become a more effective problem solver. Each strategy is applicable to many, if not all phases of problem solving. Within the seventy six strategies however, there are some obvious functional breakdowns. Certain strategies are particularly useful when applied to certain problems, or to certain phases of problem solving.

Within this text, we have separated the strategies into eight categories: Master Strategies, Strategies for Set Manipulation, Strategies of Involvement, Strategies for Manipulating Information, Strategies for Information Retrieval, Strategies for Dealing With the Future, Strategies for Physical Manipulation, and Metaheuristics. Their use and content are described on the following pages. Within the descriptions of individual strategies, there are suggestions about application to different problem solving phases, i.e. evaluation and analysis, testing, etc.

As the material is explored, more basic sets, or applications for the strategies become apparent. The following, additional delineation of strategies may prove helpful if you are working with specific objectives.

Perception

Often you may become fixated or stopped altogether on a problem because of an inability to approach the problem with a fresh point of view. The following strategies may enable you to become a more flexible thinker by expanding and changing your perceptions and your perceptual abilities.

Adapt	Hold Back	Separate
Associate	Imagine	Simulate
Combine	Play	Translate
Diagram	Randomize	Visualize
Dream	Reduce	Work Backwards
Focus	Release	

Learning

There are many approaches to learning, encompassing different levels of understanding. You may want to memorize facts, clarify your own views, or you may want to explore certain ideas in depth. The following strategies can facilitate the various stages in the learning process.

Exaggerate	Leap In	Recall
Hold Back	Memorize	Reduce
Imagine	Play	Search
Interpret	Question	Simulate

Before information or ideas can be communicated, they must be organized, clarified, and sometimes restructured. You must determine the most effective form of communication for your particular audience, and be adept with a variety of communication skills. The following strategies address these concerns:

Chart	Generalize	Understate
Classify	Imagine	Verbalize
Compare	Interpret	Visualize
Diagram	Record	Work Forwards
Exaggerate	Symbolize	

MASTER STRATEGIES

The following group is a set of overall master plans for the problem solving process. They might also be called growth strategies. Build Up is the additive process, starting with what you know. Eliminate is the strategy of starting with too much and taking away. Work Forwards is the strategy of starting at the very beginning in an inductive sense and working toward the solution. Work Backwards is beginning with the hypothetical solution in a deductive manner and working back to the solution.

BUILD UP

POWERS Build up can be seen as an organic strategy. You begin with something you are sure of - something you know is in the solution to your problem, or the seed of an idea, and add additional information to that initial core. Building up provides an opportunity for spontaneous growth. You are constantly reacting to what you have just done, adding to it, and shooting off in a new direction. Build up is helpful because it allows you to grasp a complex problem from any side and work from there to your solution.

LIMITATIONS Because you are building up in an almost random fashion, the results may lack internal organization. Also, addition of one factor can greatly influence the course of the following additions, and may lead you away from your initial goals. That is why build up is almost always used with its complement, eliminate.

EXERCISE - WHAT THE WORLD NEEDS NOW This experience is most effective with a group, but may be useful to individuals also. The experience starts with an open ended statement - 'What the world needs now is...' Each member in the group should attempt to add his own thought to the original statement. The statements should be recorded so that the ideas can be easily reviewed. At the end of the experience, the participants should compare their various methods of utilizing the building up strategy and their problems with it. This exercise doubles as an effective device for externalizing a variety of views on a subject and exposing them for discussion.

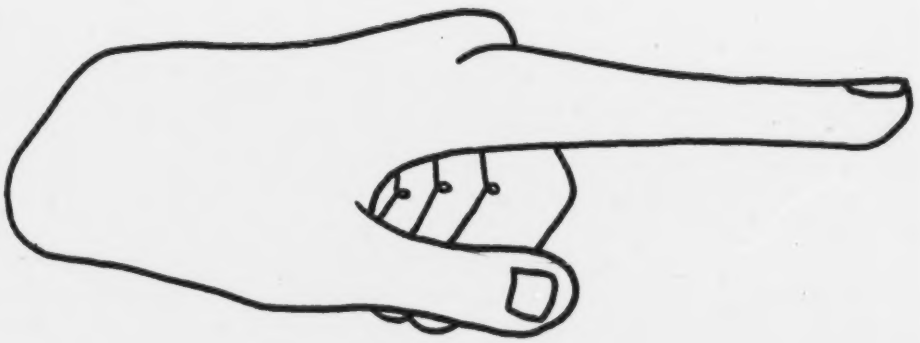
ELIMINATE

POWERS The power of elimination lies in the possibility that you may be more sure of what you don't want than what you do want. This strategy requires beginning with more than you need or want in the solution and eliminating elements according to some determined criteria. There is an element of safety in this strategy because you have not overly extended yourself by deciding what you don't want in the solution.

LIMITATIONS This strategy assumes that within the realm of possibilities you are considering, there is a good solution. However, after you've finished eliminating, it's possible to end up with nothing. Another difficulty is that it is easy to infer that you want the opposite of what you have eliminated (i.e. you don't want rain, therefore you must want sunshine, leaving out the possibilities of snow, fog, hail, etc.). Thus elimination must be tempered by caution and good judgement.

EXERCISE - I GOT RELIGION
Have each member of your group build up on the subject of religion. Each member should offer any ideas or associations he has with the subject, and the ideas should be recorded. Once the group is satisfied that they have exhausted their resources, each member of the group should take a piece of paper and a pencil and review the recorded list, eliminating whatever they don't want included in their personal religion or philosophy, and writing down on their lists anything that is left. Once everyone has finished, pin the sheets of paper to a display board so that the members of the group can share each other's ideas. This exercise has the advantage of allowing the participants to get personally involved in the subject matter through use of the strategy of elimination. The exercise can also be modified to encompass a variety of subjects. This may prove to be an effective introductory experience for a humanities or comparative religion class.

WORK FORWARDS

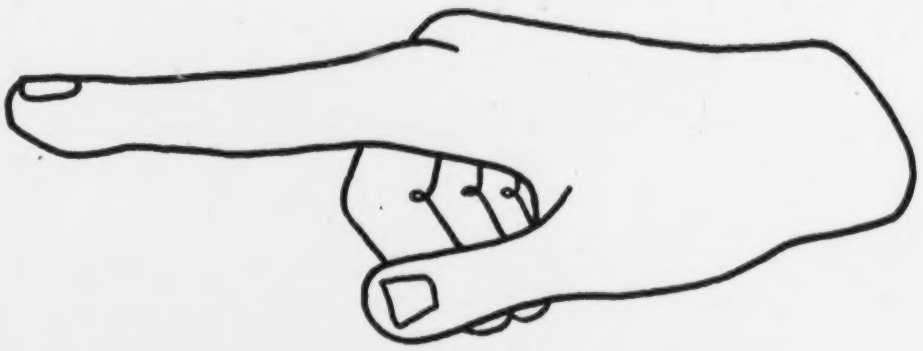


POWERS Work forwards is an inductive strategy, and implies the use of logic and rationality. This strategy moves step by step from the beginning of a problem to its solution. One of its advantages is its easily traced continuity. It is also a powerful communication strategy, because most minds tend to accept its form of linear progression. Finally, working forwards assures a firm base for each new step and thus contains an element of security.

LIMITATIONS The difficulty with this strategy is that the results are no more accurate than the original premise. Often the assumptions implied in the premise are overlooked, when it may be best to analyze and question them before proceeding. The final goal must also be evaluated to avoid spending time working towards what may prove to be an undesirable result.

EXERCISE - AUTOBIOGRAPHIES Working as an individual, or in a group, take five minutes and write a brief autobiographical sketch. After you have finished, review the process used in writing your autobiography. Did you start your account at a younger age and work towards the present? Did anyone work backwards? What about random key points? This exercise provides an example of one of the common uses of working forwards - writing. It may be helpful to discuss writers who do not use this strategy. Are they considered unique? Are they difficult or distressing to read? This exercise could also lend some insight on the way most of us order our lives and our memories in a linear fashion. Is it possible to mentally order your life using another strategy?

WORK BACKWARDS



POWERS Work backwards is a deductive strategy, beginning with an assumed solution and working backwards to the premise. You start where you want to end up, ask what should preceed that, and continue until you have reached the beginning. This strategy offers one method of skipping over a gap in your own reasoning and approaching a situation from another side. It can also help you to keep a perspective on your work.

LIMITATIONS Working backwards contains some of the same limitations as working forwards. It relies on the assumed conclusion, and the resulting logic is no more valid than that conclusion. Also, something developed by working backwards may not seem as developed when it is reviewed by working forwards.

EXERCISE - PLAYWRITE Offer your group the last scene of a play. Have them individually reconstruct the play, figuring out what the rest of the play would be by looking only at the last scene. A variation on this could be to have one person write the next to last scene, hand it to someone else and have him write the scene before that, and so on. This exercise would be particularly helpful in demonstrating the differences between work backwards and work forwards. Ideally, after the participants have written their own reconstruction of the play, they should have the opportunity to see the complete play as it was originally written, and to compare its ideas with their own.

STRATEGIES FOR SET MANIPULATION

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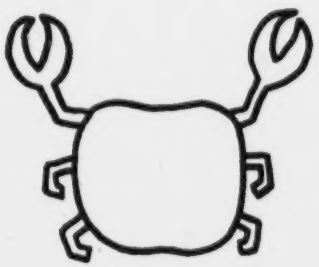
The following strategies can be used to maneuver within bodies of information. Associate is a strategy for jumping from one piece of information to another in the mind. Classify organizes information by sets. Compare looks at similarities and differences between pieces of information. Generalize moves focus from a specific member of a set to the concept of the set as a whole. And exemplify goes from a more general class to a specific member within that class.

ASSOCIATE

POWERS This strategy involves making use of associations. The process takes advantage of the natural connectivity of experiences in the mind. In a sense, associate can serve as a search strategy, finding things through first finding an associated aspect of them. By following associations, you can be led to new and innovative ideas that would not normally be connected. It can also help to break fixations and add new perspectives.



LIMITATIONS Associations are very often temporal, are the product of convention or culture, or are trite. Thus, following associations can itself lead to fixation. Also, this process, if unfruitful, can be a waste of time and energy.

EXERCISE - CUTUPS Place a box in the center of the floor and pass out pencils and paper to the group. Ask them to write words that they like. If you notice that they are writing mostly nouns, suggest active words, descriptive words, etc. After everyone has put their words in the box, shuffle them and ask each person to grab a bunch of words to work with. Ask them to combine the words into phrases and the phrases into poems or stories, adding only essential transitional words. Discuss the different combinations and associations that have been made, and the origin or basis of the various associations.

CLASSIFY

POWERS Classifying allows us to organize information into sets, label those sets by the common properties of their members, and then conceptually manipulate the labels as abstractions. Classify depends on being able to identify things and to find similarities. The ability to classify is critical to almost any living organism, for without classifying, each new perceptual unit would be unrelated to any previous one. Classifying is also critical in dealing with large amounts of information. Finally, it can be used in communication to organize information so that it can be easily understood.

LIMITATIONS In the presence of a class, many individual properties are ignored. Thus, classifying always has the limitation of overlooking individual properties in favor of reducing the complexity of the situation. Over simplification can cause confusion and misunderstanding. It is advisable to be aware of the distinguishing factors which form the basis for your comparisons.

EXERCISE - GRAFITTI PROJECT Have your group break into small teams and collect grafitti from local sources. Regroup as a whole and discuss the various classifications that could be made within the grafitti, i.e. subject matter, location, creativity, etc. A far ranging discussion of grafitti and its uses should be encouraged. When the group has gained some familiarity with different classes of grafitti, they should attempt to create some of their own, specifying what category their creations fall into.

GENERALIZE

POWERS The power of generalizing is to get away from specifics, to see things in larger perspective, to form theories and concepts, to search for basic principles. It is essential to hypothesis formation. If you can't generalize what worked in one particular situation and abstract it, it may be very difficult to re-apply it in another situation. It is also an important teaching and communication strategy. It is movement from the experiential to the conceptual.

LIMITATIONS The limitations of making generalizations are the problems of remaining too abstract, never testing your theories, or always staying away from immediate commitments. Also, dealing with abstractions constantly may cause you to lose touch with reality. The remedy for too much generalizing is exemplifying.

EXERCISE - THAT'S TYPICAL Brainstorm and try to list five modern roles, i.e. a hippie, a pig, a parent, etc. Try and balance out the list by calling for representative types over a wide area. Once the list is set, brainstorm again on each role, thinking of as many general attributes of the role as possible. Once this has been done for each role, look over the list again and study the nature of the generalities. What is their origin? Do most of them have some truthful basis? What are some positive and negative uses of generalities?

EXEMPLIFY

POWERS To exemplify is to make specific, to give an example of, to concretize. Specifying is a good way to tie an idea down, to test it. It is giving specific context to a concept. It also can be used as a strategy to encourage yourself to think clearly and precisely, to keep from hiding behind generalities and nebulous statements. It also can be a way of testing someone else to see if the assertions they make are supported by specific examples and experiences.

LIMITATIONS It is easy to get bogged down in specifics before you've really settled more fundamental aspects of the problem. It is important to remember to cycle between the two strategies of exemplify and generalize lest you get fixated through overuse of one.

EXERCISE - 'I ALWAYS SAY...' Give everyone in your group five minutes to think of some generalization they really believe in. Each person should then relate his generalization to the group, and back it up by giving specific examples. Other members of the group may want to think up examples that negate the generalization. After the experience, discuss some common generalizations and try to break them down into specifics.

COMPARE

POWERS Comparing is a critical strategy in the process of classifying. To compare is to put two things together either physically or mentally and to look for similarities and differences between them. It is an important strategy in the problem solving phases of analysis and evaluation. Comparing can be a powerful way of describing something or of communicating an idea. It is also critical to concept formation. By mentally comparing several events or facts, you can abstract common principles which can form new concepts.

LIMITATIONS The major drawback of this strategy is the possibility of making 'unfair comparisons'. That is, pointing out similarities or differences which are in fact superficial to the elements in question. Often you can freeze or fixate yourself on one basic comparison, ignoring other factors. Comparing can also be limiting, as it considers only the variables which are being compared.

EXERCISE - COMMUNICATION Express one idea/feeling such as anger, fire, anxiety, in three ways. You may want to try clay, drawing, writing, dance, etc. If you are doing this in a group, display your work and compare it with others. Try to determine which medium or method communicates different ideas most effectively. Discuss your ideas with others in the group.

RELATE

POWERS To relate is to link, connect, find causal relationships. The focus of this strategy is on the connection between two entities, rather than on the entities themselves. Relating and finding relationships are major ways in which we structure our experiences. Our ability to abstract or generalize is dependent upon our ability to make relationships in terms of some more general principle. Two experiences may take on more meaning if they can be connected in some way. Relating also has the effective quality of tying things down, securing them, fixing them.

LIMITATIONS There is always the danger that relating two factors can be done prematurely or in terms of some irrelevant functions. Again there is a question of timing and context. Finalizing or fixing relationships should be done with the realization that this may restrict your future investigations.

EXERCISE - SPACE TIME CARDS Pass out cards to the group and ask the members to draw their concept of the relationship between space and time. The exercise should be followed with a discussion of how each individual feels about his creation and the creations of others. This can serve as an easy lead in to a discussion of relationships to the environment, etc. Any subject can be broached in this manner by substituting other set words than space and time. As the group forms their relationships and dicusses them, ask them to determine the basis of the relationships they have formed, and the inherent limitations if any.

STRATEGIES FOR INVOLVEMENT

The following strategies cover a variety of ways of controlling your attention and relationship to a problem. Commit brings closure, while defer lets matters slide. Leap in involves, while hold back maintains perspective and waits. Focus limits and narrows attention, and release lets it wander and spread. Incubate makes use of subconscious attention, while purge releases attention by getting thoughts out of your head into some other form. Force uses will power to direct attention, and relax frees attention by getting rid of tension. Dream uses the subconscious as a processer and storer of information, and imagine encourages images to form with focused attention.

COMMIT

POWERS Commit solidifies your position and attitude towards a problem. To commit is to decide, to bring closure, usually so that something else can happen. It is opting to take some action that will insure closure, with the understanding that you will have to abide by your decision. As other strategies that advance your position within a problem, committing is very useful when you are working within the constraints of limited resources and other external pressures. It is related to leap in as a strategy, but it is not identical. Commit forces conclusions, while leap in forces involvement in a particular situation, but does not define the exact nature or extent of that involvement.

LIMITATIONS To commit does force closure, and closure at the wrong time can be destructive and limiting. The timing of the use of commit is critical. Where risk and significance is low, early commitment may be appropriate. Where the stakes are high, committing must be chosen only after some thought.

EXERCISE - I DOUBT IT This is admittedly a mock experience in the commit/defer strategies, but it does effectively communicate the importance of timing in this form of decision making. Deal out a deck of cards equally among a group. The dealer starts the game with '2'. He says '2' and lays face down on the board all of the 2's in his hand. The person to his left takes '3' and so on. When the highest card is played, it starts again around the table with '2'. You are encouraged to cheat in this game. Since no one can see what cards you are actually laying down, and since the person who gets rid of all of his cards first wins, you can lie about the cards you are actually laying down. But - anyone else in the group can doubt you and call your hand by saying, 'I doubt it.' You then have to turn over the cards you just layed down. If you were cheating, you must pick up all the cards on the table. If you were honest, the person who doubted you must pick them up. The game is most effective if two or more decks are used. Both the cheater and the doubter are putting themselves into a risk situation where they are committing.

DEFER

POWERS Defer is the 'put off to another time' strategy. It is part of a spectrum of extremes; you either commit and make a decision, or defer from making a decision. Defer is a powerful strategy because it keeps a situation flexible and open. Rather than force premature closure, defer puts issues aside and moves on to other matters. This strategy has a wide range of uses. You defer from evaluating ideas to allow them to develop. You may defer on dealing with dependent variables until the independent ones have been dealt with. It may be better to defer on doing something as planned and to take advantage of a particular situation to go on to some alternate plan. In teaching, you could defer on presenting a subject if it is clear that the timing would be bad at that moment.

LIMITATIONS Because defer puts things off, it can also be an excuse strategy. Defer lets things slide, and there are many situations where it is better to make some decision than to continue under the pressure of uncertainty. Thus, excess use of deferring as a strategy can lead to escapism, weakness and lack of personal growth and self-actualization.

EXERCISE - APPLE DOLLS Take a particularly juicy, delicious looking apple. Peel the apple carefully, and make small gouges in it for eyes, nose and mouth. Set it in a dry place for two weeks. At the end of the two weeks you will have the head of an apple doll which looks amazingly lifelike. The obvious decision involved in this exercise is whether you would rather commit immediately and eat the apple, or defer for two weeks on the chance that the apple doll will prove to be more rewarding. The exercise is particularly effective with younger children, who tend to be impatient about waiting two weeks for a product.

LEAP IN

POWERS To leap in is to become involved, to throw yourself into a situation, to become immersed, to jump into a problem without being totally prepared. It places you in the middle of a problem situation so that you personally experience all the factors involved and begin to get a sense of what the issues really are. There are many situations in which you have no way of knowing or predicting what they are going to be like, and must dare to leap in in order to get a better perspective and understanding. Its advantages include the fact that it can greatly accelerate your progress towards the solution of a problem because it avoids potentially wasteful preparation and isolated analysis.

LIMITATIONS Where the cost of failure may be high, leaping in may not be a good choice of strategies. Because leaping in has the affective aspects of bravado and self confidence, it may also have the effect of irritating other people if misused.

EXERCISE - ADVENTURE
There is undoubtedly some activity, some creative group, some classes offered in your area which you have been hesitant about going to. If you can't think of any, ask friends for suggestions. If nothing else, think of a part of town you seldom if ever go to. Once you have established your objective, leap into the situation. Be conscious about your use of the leap in strategy. Perhaps this may involve taking a one-shot belly dance class. It may mean simply going into an intruiging coffee house you have been shy about entering. If you are doing this with one other person or in a group, discuss your reactions to the experience.

HOLD BACK

POWERS Hold back includes such actions as waiting, observing, listening. It involves detaching yourself from the immediate context of a problem and attempting to get outside of it to gain perspective, while at the same time not pulling away from the problem itself. Holding back involves caution and possibly scepticism. In some ways, holding back is similar to deferring. The difference is that you are not moving tension elsewhere, but rather continuing to attend to something from a distance.

LIMITATIONS Holding back, like deferring, if misused can become an excuse for lack of commitment and involvement in a problem. If you hold back and wait for too long, you may lose your chance to make a significant change.

EXERCISE - EVALUATION This is primarily an evaluation exercise. Try to remember some times in your life when you used the hold back strategy. As you remember them, record them on a sheet of paper using key words. When you have exhausted your memories, review the list and evaluate your use of the strategy in each situation. In retrospect, do you still feel you should have held back in each situation? Did you lose anything by holding back? Was it the most appropriate strategy to use at the time? Does your evaluation show that you have a process bias either for or against using this strategy?

FOCUS

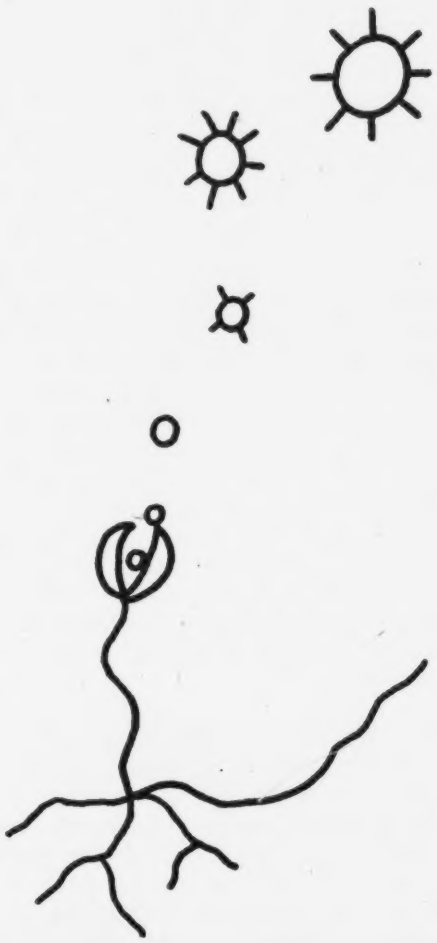
POWERS Focus is the conscious placement of attention in one specific area. When you focus on something, you are directing all of your senses to perceiving and dealing within a limited space. Focusing brings concentration. It is critical for continuity in a line of reasoning and for maintaining complex relationships in the mind. It is important for self-control in all areas of human activity. Focus as a strategy can maximize a limited resource of energy and tends to be a useful strategy to attain efficiency and speed in problem solving.

LIMITATIONS The danger of this strategy is that you may lose perspective and develop a very piecemeal view of your problem. Too much highly focused thought can be limiting and lead to a kind of rigidity. If all of your attention is focused on one subject, then you will naturally be unaware of other things around you. Also, too much focused attention over periods of time can drain your energy. It may be better to use these high-powered shots of attention sparingly.

EXERCISE - COLOR WALK Attention involves focusing energy, finding excitment in discovery, being very much awake. As an exercise in focused attention, go on a color walk. Select a color and look for as many objects as possible that contain it. This may be most helpful on a walk that you have taken often, usually with a general or released attitude. Go on a yellow walk today, a blue walk tomorrow, an orange walk the next day. If you are in a group, have each person choose a different color for the walk. When you have finished, discuss the walk from your point of focus. When people are all focusing on different aspects of an area or a problem, how does it affect their general perceptions or understanding?

RELEASE

POWERS Release as opposed to focus relinquishes control of attention and permits the mind to wander. Release takes a wide scope and attempts to deal with many factors simultaneously. Releasing attention allows both subconscious and external stimuli to attract consciousness. It is a strategy for opening up and allowing yourself to be the follower rather than the leader of your train of thought. It is an important strategy for breaking out of fixation and allowing other points of view to present themselves.



LIMITATIONS To release concentration too soon may prevent the formation or completion of a concept. When you release focus, the energy required to refocus attention may be difficult or impossible to achieve within a certain time limitation. Release allows the mind to become flooded with other considerations which might steal focus away from the original problem. To release when you have gained a certain amount of momentum may be self-destructive. It may be worthwhile to try to schedule or plan periods of release to coincide with natural breaking points within a problem.

EXERCISE - PANDORA'S BOX Choose an area of current concern that interests you; ecology, the Vietnam war, youth, etc. Once you have established your area of interest, close your eyes and let your mind wander over the whole of the subject. Do not try and guide your thoughts, rather try and follow them. Have you extended your thoughts on this subject further than you normally do? If you were focusing in on one point, would the other points you discovered during your release period be important to consider? Do you think this would be a helpful exercise to balance heavy focusing periods? What other release exercises have you generated on your own?

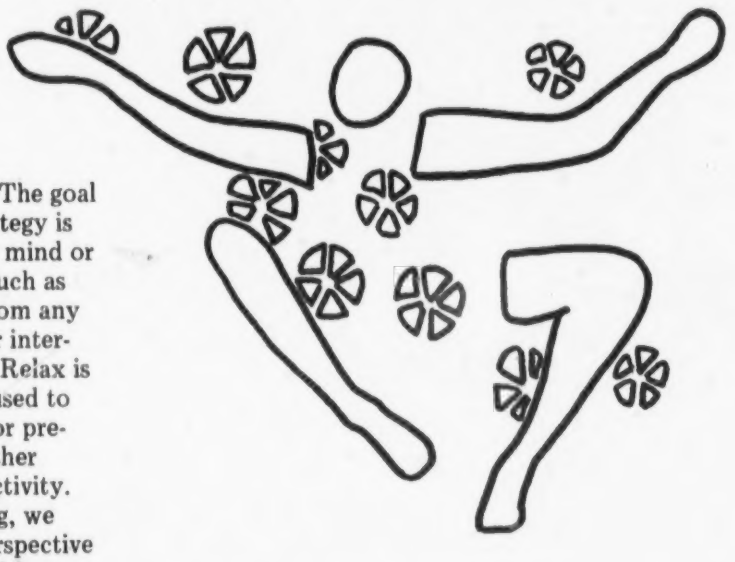
FORCE

POWERS Forcing uses will power to direct attention in spite of desires, feelings and abilities. The power of force as a strategy is that it uses will power as a motivational drive and pushes you on through the most unpleasant aspects of the problem. Forcing is a means of extending your perceived limitations. It pushes you to go beyond what you think you are capable of doing. Forcing is often necessary to break through inhibitions and fixations and fears. Forcing does not have to be extreme, but it involves exerting some determination to see yourself through a certain activity.

LIMITATIONS Applying force where it cannot produce a useful change is a waste of time and energy. Forcing things may have unfortunate repurcussions. In emergencies the use of force may be absolutely necessary. In general though, forcing is not always the best strategy, especially before you have explored other approaches to the problem.

EXERCISE - CREATIVE FORCE Pick up the daily newspaper and turn to the second page. Choose one word out of the headline on the first column. For the next hour, force creatively on this word. Write a short story or free style poem, draw a picture, take a photograph, make a collage, etc. Do not give up and choose another word. Stick to the one you originally chose. At the end of the hour, your creation must be completed. Review your experience mentally. How difficult was it? Did your mind keep trying to relax or wander from the problem? What techniques did you use to keep your energy on the task? Could these techniques be used in other situations?

RELAX

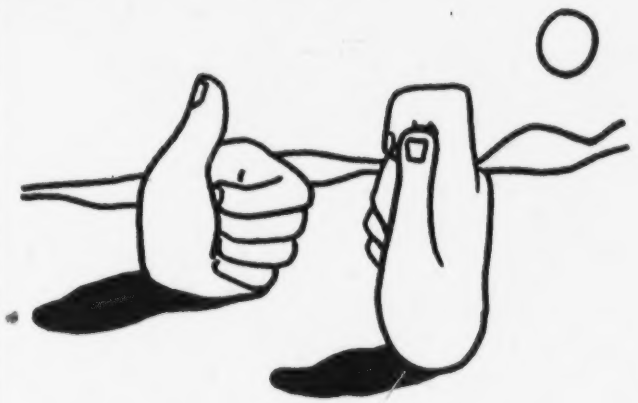


POWERS The goal of this strategy is to free the mind or body as much as possible from any external or internal force. Relax is normally used to rest from or prepare for other kinds of activity. By relaxing, we can get perspective and replenish our energy, then move slowly back into the problem situation and get a fresh point of view. The state of relaxed concentration is a fine balance of not overly focusing or forcing the mind, but at the same time not letting it totally unwind or wander. Relaxing basically rids the mind of wasteful energy and needless worry and allows only that which is really essential to remain.

LIMITATIONS Relaxing must be used sparingly in a problem solving context. Relaxing may simply be a device for escaping the difficulties of a problem. You must learn to maintain a balance between excessive relaxation and excessive expenditure of energy.

EXERCISE - CLEARING THE GROUND The following exercise will help to clear the mental ground so that relaxed attention can be maintained for longer periods of time. Sit comfortably erect, hands on your thighs, eyes closed. Follow your thoughts for a minute or so without judging them. Now gradually begin to attend to your breathing, breathing in one count and out two counts. There are many ways of achieving relaxation. Try this one, but experiment with others and find the one that's best for you. Keep a time limit on your relax periods so that you don't find you've completely forgotten or neglected your original activity.

DREAM



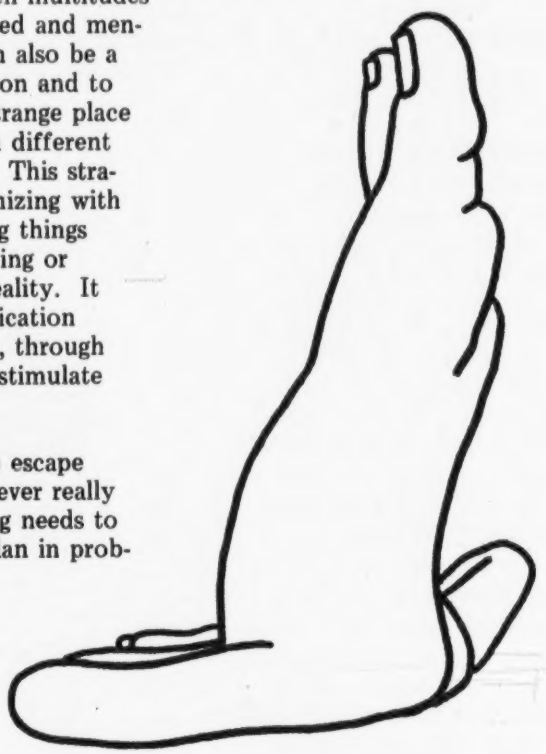
POWERS To dream is to have vivid thoughts, images or emotions during sleep. Dreams contain important insights into the subconscious and are potentially rich sources of inspiration. It is important to note that a distinction is being made here between dreams and daydreams. Daydreams are included within the strategy of imagine. Dreams can often produce novel combinations or ideas which might prove to be difficult or impossible to initiate during periods of wakefulness.

LIMITATIONS Dreams are frustratingly difficult to capture and unreliable to count on for innovative thoughts. The best you can do is be aware of the potential of dreams and explore ways to tap that potential. To rely solely on dreams to solve your problems would be unfruitful and unrealistic.

EXERCISE - DREAM BOOK It is not feasible to offer a 'dream experience'. However, you may want to get a notebook and use it exclusively for recording your dreams. Don't be discouraged by their choppiness or seeming absurdity. You may want to try illustrating some of them. The book could have many possible uses - as a creative resource, as a record of your subconscious, as a dream diary, etc.

IMAGINE

POWERS When you imagine, you form mental images, pretend, daydream, or use your imagination. The ability to mentally project yourself into another situation in time or space can be very useful in problem solving. Imagining is the easiest form of simulation. Imagining is very useful during early stages of alternative generation when multitudes of alternatives can be imagined and mentally changed. Imagining can also be a good strategy to break fixation and to project yourself into some strange place or situation in order to get a different perspective on the problem. This strategy can be a way of empathizing with others as well as experiencing things which might be too threatening or dangerous to cope with in reality. It may also serve as a communication device. By sharing an image, through words or pictures, you may stimulate the imagination of others.



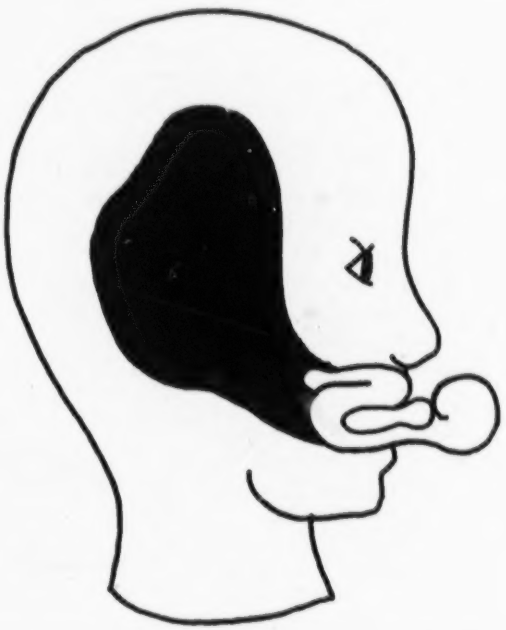
LIMITATIONS It is easy to escape into your imagination and never really tie yourself down. Imagining needs to be integrated into a larger plan in problem solving. Once again, it is important to develop a sense of timing, to know when to stop playing with mental images and externalize them for testing and evaluation.

EXERCISE - ENVIRONMENTAL EXTREMES Close your eyes and try to imagine another planet. Are there people there? What textures can you find? Record all of the details of your planet. What have you imagined? Is there any way to realize what you have imagined? In your room? In some creative form?

PURGE

POWERS Purging releases tension and concern through externalization. When you purge, you get all your ideas out in some external form and free your mind to work on other things.

LIMITATIONS Because purging does have the effect of freeing the mind from worrying about a particular issue, there is a danger that ideas can be purged while still in infancy and not be allowed to develop. If ideas are purged too early, they may be put aside and never reconsidered. Also, if one purges too early in a conversation, the opportunity of discovering someone else's ideas may be lost.



EXERCISE - DUTY FREE Most likely there are random jumbled thoughts or anxieties or reminders in your mind which have been there for the last day, week, or longer. Purge them out and record them clearly on a piece of paper. Put the paper in plain view somewhere. At this point your mind should be free to work on things at hand after having purged. Is it? Try going about your work for a day or two and see.

INCUBATE

POWERS Incubate makes use of subconscious processing of concepts and plans. It involves setting a problem aside and moving on to some other activity, but allowing the subconscious to continue to work on the original problem. Some kind of interest or concern with a problem seems necessary to insure incubation. Because incubate involves background processing, it can only be consciously initiated and then periodically reinforced by introspection.

LIMITATIONS Any attempt to consciously use the subconscious has the limitations of its indirectness.

There is no guarantee that anything useful will happen. It is not a reliable strategy, especially if you have a time limitation. It is best used as a backup strategy, in parallel with those that are more reliable.

EXERCISE - THE ALPHABET GAME It is difficult to structure an experience in incubation as the strategy utilizes subconscious activity. The following game does contain a high potential for use of the strategy however. Write the alphabet vertically on a piece of paper. Choose a sentence at random and write it vertically alongside the alphabet. Terminate the sentence with whatever letter is parallel to z. You now have a column of initials. Try and think of a famous person or fictional character for each initial. You have ten minutes. Review the processes you used to think of the names. A variety of processes were probably used. However, if you concentrated on some initials and couldn't think of a name, but a name for them suddenly popped into your mind while you were working on another set, you were most likely using incubation.

STRATEGIES FOR MANIPULATING INFORMATION

The following strategies cover a variety of ways of dealing with information once it has been collected. Display spreads out information so it can be taken in visually. Organize, which covers a whole range of sub-strategies, structures existing information. List orders information in a sequential form. Check maps one set of information onto another. Diagram displays information qualitatively, or in a non-dimensional way. Chart displays information quantitatively, or in a dimensioned way. Verbalize expresses information in terms of words, and visualize as a strategy expresses information in graphic or visual terms.

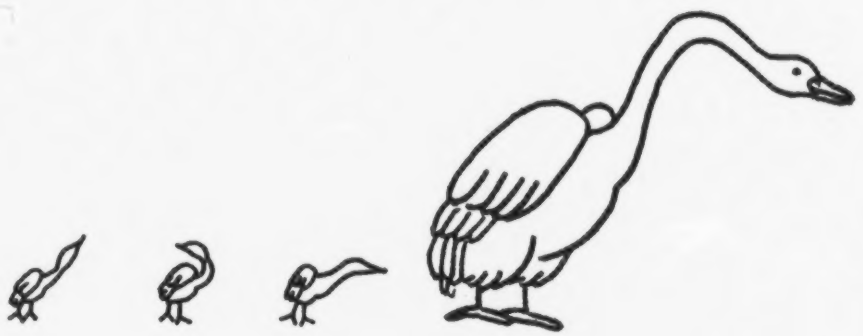
DISPLAY

POWERS Display changes information into a state suitable for visual analysis. It is difficult to juggle more than a few elements in your mind, but if the information is recorded and displayed, a kind of external logic and memory can be maintained. Display often preceeds some kind of analytic or manipulative strategy. It helps to display all the elements you have before you can organize or categorize them.

LIMITATIONS Any externalization of information can foster fixation. The original pattern in which information is presented will naturally influence any further perception of it. Having to juggle things mentally may help to keep ideas in a more nebulous form. There is also a time factor involved. One must weigh the amount of time devoted to making a display against the benefits. Also, if you do not check yourself with other organizational strategies, the display will get so huge as to be unwieldy.

EXERCISE - THE BIG SHOW There are many things that can be displayed and many ways to display them. For this exercise, you will be displaying yourself, picking and emphasizing certain factors to achieve a specific effect. If you are part of a couple or group, try these out on each other. If not, work in front of a mirror. Decide upon a number of roles or impressions you would like to communicate - being open and friendly, being businesslike and efficient, being closed off and anti-social, etc. As you work out your displays, review them visually and try to determine just what factors combine to produce a certain role.

ORGANIZE



POWERS The strategy of organization permeates most of the other strategies. The power of organize is that it gives order, and order can achieve cohesion and coordination. A concept can be viewed as an organization of experiences. It allows us to relate one experience to another. We organize to fix relationships, to make patterns, and to regulate so that we may cope with the complexity of a situation.

LIMTATIONS Too much organizing can lead to fixation, rigidity, lack of freedom, lack of chance, lack of growth. In problem solving, one is constantly balancing between keeping things free and loose, and the opposite drive towards closure. As long as you realize the limitations of the organization you consider, you are less likely to become fixated.

EXERCISE - A HIGHER ORDER Choose something in your room to reorganize - a closet, a desk, a set of shelves, etc. As you organize, constantly check your desired goals and see if they are being met. Do you want easy access, a secure enclosure, a categorized order, good visual review? When you are organizing other things, do you generally have a good idea of what you are organizing for? Would it help to?

LIST

POWERS List is a powerful way of recording information and organizing it in such a way that it can be easily manipulated. It transforms a body of information into a set of elements. A list is very easy to examine, restructure, check or search. To list can be a kind of purging strategy to get down ideas and display them so they may be examined, ordered and utilized. Listing is also a strategy for remembering and recording.

LIMITATIONS The limitations of this strategy are mainly due to its simplicity. As a form of organization, listing can at most show order, but there are a multitude of relationships that cannot be expressed by this form. A list is often boring and one-dimensional as a form of communication, and does not express a great deal. It is usually an intermediate strategy in a more complex plan.

EXERCISE - CARD SHARK Gather a group of four to play a card game. Play the game as usual, but provide two of the players with paper and pencil to list the cards as they are played or become visible. Do the people who are listing make good use of their lists? Discuss the strategy and its value in other operations.

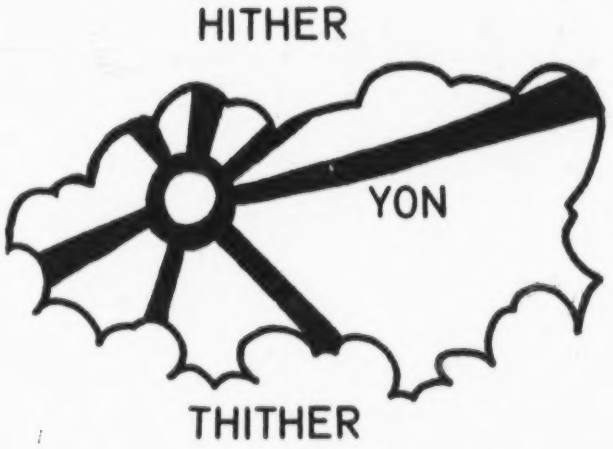
CHECK

POWERS To check is to test or compare one set of information against another. Like any comparison, checking involves looking for differences and deviations as well as similarities. It is a strategy for questioning assumptions concerning expectations and results. Checking can be considered a defensive strategy in the sense that it stabilizes and reinforces position for the status quo as opposed to advancing the situation. The appropriatness of checking as a strategy is dependent largely on the importance of being successful or achieving expected outcomes.

LIMITATIONS Checking usually involves an expenditure of time and energy that may not prove necessary or worthwhile. Too much checking can be an inhibition. Because checking often involves lack of confidence in someone else's efforts, checking can have inherent limitations in interpersonal relationships.

EXERCISE - MOODS You are going on a mood-awareness walk. Before you start, hypothesize the predominant mood you will encounter on your walk (greediness, joy, excitement, etc.). Record your prediction, and then go on the walk, equipped with paper and pencil. Check as you go along and record factors that substantiate or contradict your theory. When the walk is completed, check your list again. Was your hypothesis correct? Do you think that your awareness and checking on the walk was influenced by your hypothesis?

DIAGRAM



POWERS A diagram includes sketches, rough diagrammatic plans, and any other graphic presentations which indicate general relationships. The power of diagramming is closely related to the power of graphics and visual expression. The diagram is a quick way of translating relationships into an easily perceived form. As an investigative strategy, one can explore through the diagram a variety of new symbolic relationships. As a strategy, it can force you to re-examine a problem from an unusual or new perspective, and it can also offer you something concrete and visual to react to. It is also a way of breaking through verbal misunderstanding and expressing relationships in as symbolic and abstract form as possible.

LIMITATIONS Because diagrams are symbolic, qualitative and abstract, they have severe limitations in terms of the amount of quantitative information they can communicate. They depend on everyone interpreting symbols involved in the same way. There is also the danger that the diagram will be interpreted too literally, so one has to be careful about not implying any more information than is actually intended.

EXERCISE - I THINK IT'S YOUR MIND This exercise would be most effective in a couple or group, as it points out the benefits of diagramming as a communication strategy. Have each member of the group try to diagram what they think is the relationship between the conscious and the subconscious. Give them only three minutes, so that artistic ability doesn't enter in. When they are completed, review each other's diagrams. Did the diagrams add to previous verbal or conceptual understanding? Did you find out anything about other people's approaches to the subject? Also, note the different types of diagrams that were used and whether they were primarily verbal, graphic, or a combination of the two.

CHART

POWERS A chart is perhaps the densest form of two dimensional communication we have. It permits you to express a great amount of information on one piece of paper. Charts include any kind of two dimensional simulation; maps, measured drawings, graphs, and certain kinds of tables. In a chart, physical relationships have explicit meanings. It is a powerful strategy to force yourself to be explicit, especially when dealing with matters that have direct physical significance. It is also a way of recording information so that it can be used at a later date.

LIMITATIONS The limitations of charting involve the amount of time and energy it takes to create a chart. Also, if charting is to be used as a strategy for simulation, one must be careful to keep the degree of accuracy of the chart reasonably related to the accuracy of the ultimate design. It is useful to cycle between several different kinds of charts to keep from letting the conventions overly limit your view of the problem.

EXERCISE - ROOM DESIGN This exercise begins to explore one use of charting. Make a chart of the room you're in to scale. On a separate piece of paper, make drawings of and cut out the pieces of furniture in the room. Rearrange the furniture on the chart of the room until you have hit an arrangement that is pleasing to you. What are the benefits of charting before executing an operation?

VERBALIZE

POWERS This strategy is part of a common dichotomy between words and pictures; verbalize and visualize. Verbalizing seems best for describing concepts and complex events. Verbalizing can be a powerful strategy for encouraging yourself to externalize your thoughts and feelings. By trying to express them in words, it forces you to consider them carefully and opens up the opportunity for constructing new concepts.

LIMITATIONS The major limitation of verbalizing is the fact that the strategy is overused. We do a great deal of talking and writing and have forgotten about our other senses. Words are very poor at describing visual experiences, and in some cases, only the experience itself can communicate the richness you're trying to convey.

EXERCISE - EVERYBODY'S TALKING AT ME While it may first appear that most people rely heavily on verbalization as a communication strategy, you may find that they heavily supplement this strategy with others. For one day, be particularly aware of other's communication and keep a record through the day. Are people using other communication strategies (i.e. diagram, display, visualize, etc.)? If people were more aware of the other strategies they use, how do you think it would affect their effectiveness in communication?

VISUALIZE

POWERS The powers of visualize as a strategy are related to the powers of sight as opposed to sound. It is an expression in visual terms, and includes all forms of graphic media as well as physical constructions and demonstrations. When used to refer to internal visualization, it becomes closely related to imagining as a strategy. Because visualizing leads often to a graphic product, there is an opportunity for insight resulting from the visual feedback and analysis which may occur. It is also a good strategy of communication when there is a language barrier.

LIMITATIONS There are certain concepts that are difficult to explain in visual terms; reasons, motivations, logical sequences. We have not yet developed a formalized language of graphics or vision. However, it is often useful as a means of breaking away from your conventional mode of communication and of gaining a new perspective.

EXERCISE - I SEE Pick a general contemporary problem that concerns you - ecology, racial prejudice, violence, etc. Now close your eyes and visualize the situation in its extreme, including as many details and graphic mental images as you can manage. Force yourself to extend your thinking as far as possible. What impact do these visualizations have on you? Do you think they could be effectively communicated to others? How?

STATEGIES FOR INFORMATION RETRIEVAL

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The first two pairs of strategies differentiate between internal and external forms of recording and retrieving information. Memorize means to commit to memory, to use a human brain, and recall involves remembering stored experiences. Record is to put down information in an external, semi-permanent form, and retrieve is to recover stored information. The final pair of strategies serves to seek out and choose external information. Search is to look for new information, and select is to pick one alternative from a set.

MEMORIZE

POWERS Memorize as a strategy structures perceptions so they can be easily recovered, and focuses on the brain as an information storage and retrieval system. The power of this strategy is that your storage system is always with you. Where immediate responses are important, memorizing can bypass conscious searching and recalling. It also is helpful when you are repeatedly using a piece of information. It is a good process for involving yourself with a body of information. In the process of memorizing, you are often forced to examine and consider information more closely.

LIMITATIONS What is committed to memory may have no meaning for the learner. Any intelligent recall will be difficult. Also, the relevance of the memorized knowledge must be examined. Memorizing a few dates may be less important than memorizing the significance of the dates.

EXERCISE - TRAY OF OBJECTS Assemble a tray of random objects, familiar and unfamiliar. Study it for two minutes and then try to record all objects from memory. How did you do? What techniques did you use for memorization? Did you mentally classify objects? Did you have them in a certain order?

RECALL

POWERS Recall is absolutely essential to any learning and survival. As a strategy, recall is the conscious use of past experience to deal with a present situation. As a learning strategy it is often important to recall and then compare selected past experiences to the present one in order to find relationships and meaning that can offer perspective on both the past and the present. Recall can prevent you from repeating mistakes, and recall of particular plans or strategies can supply you with the tools for the present problem.

LIMITATIONS Recall is not always a reliable strategy, and its limitations are related to the limitations of human memory. Also, there may be times when it would be useful to avoid fixation and approach a problem without the use of recall. The overuse of the strategy of recalling or remembering may inhibit new thinking on the part of the problem solver.

EXERCISE - THOSE WERE THE DAYS What is your present political position or belief? What led up to it? Try and recall the situations that produced your present political commitments. Do you find this strategy difficult to utilize? What techniques or strategies would help you in this process (imagine, associate, record, etc.)?

RECORD

POWERS Record is the externalized memory strategy, storing for future reference and retrieval. Recording allows information to be saved and communicated. It bypasses the inaccuracy and fallibility of the human mind. Record can be used in conjunction with display to externalize complicated relationships and bodies of information and allow them to be manipulated. Recording can also be used to force commitment, avoid misunderstandings, and augment your ability to communicate with others.

LIMITATIONS A great deal of time and energy can be spent recording information that will never be used. Also, most recording is dependent on the strategy of retrieval at some point. Too much recording can inhibit your own thinking and inhibit the actions of others. Recording also tends to fix concepts, force closure, and may serve to prematurely condense and finalize your thoughts.

EXERCISE - GOT YOU The next time you find yourself in an involved conversation or discussion with another person, record key points of the talk on a piece of paper. Defer any judgement about the conversation or the recording until they are completed. Finally, review the record and try to note the different strategies that were used during the conversation. How does recording change your memory of the conversation?

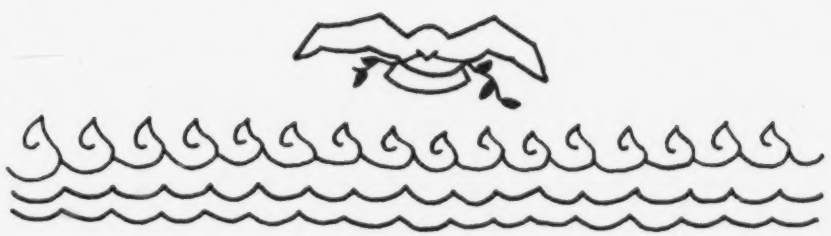
RETRIEVE

POWERS This strategy forms the second half of the record and retrieve cycle. It involves recovering and presenting the ideas and information that have been previously stored. The power of retrieve is analagous to that of recall. By pulling out past knowledge, you obtain a rich store of material to work with. Retrieve can be considered a preparation strategy and is almost always followed by the use of other strategies.

LIMITATIONS This strategy almost always involves an expenditure of time and energy. Searching and finding the material is often quite difficult. Also, this strategy may discourage you from adapting to a new situation and dealing with it in innovative ways.

EXERCISE - THE WRITTEN TRAIL You are going to construct a bibliography of your writing over the past five years. Try and remember any written trail you have left, including letters, diaries, etc. Do not record anything that has been lost or destroyed. How much of your writing in the past was executed with the idea of eventual retrieval? What system might be effective for facilitating retrieval of information you would like to keep track of - a notebook - a card file - your memory?

SEARCH



POWERS Searching is usually done with a sense of curiosity, dissatisfaction and the desire to go on to new territory. Once you have decided to search, either visually or conceptually, there are many other sub-strategies or search strategies that you can use. Searching involves a dissatisfaction with the status quo, and offers you an opportunity for new advances. As an inquisitive strategy it can increase your experience and expand your horizens. As an exploratory strategy it may lead to a deeper understanding of your problem.

LIMITATIONS When using the search strategy, you may not give yourself enough time to stop and work with what you already have. Constant searching may also be a symptom of insecurity or defensiveness. As with any strategy that advances your position, there is a risk involved, and an added expenditure of time and energy that must be considered.

EXERCISE - FANTASY QUEST Keeping in mind that searching involves a desire for change and a dissatisfaction with the status quo, try to decide what you would most like to find. This may include intangibles such as security, peace, etc., or it may be something quite concrete, like a good Chinese restaurant or a certain dress. Once you have established your goal make a list of the most likely places your search should cover. Then evaluate the desirability of searching in terms of time and other restrictions. How do you generally conduct your searches? Are they generally fruitful? What techniques can help you search?

SELECT

POWERS Rather than expanding solution space, select moves in on a specific alternative in order to feed it into the final solution. Select forces you to make a decision and limit your actions for a period of time. The power of selecting is that it forces you to progress into another phase of problem solving. It forces closure for a point of time on one sub-solution. Select does relate quite closely to commit as a strategy, but when you select an alternative you are deciding to explore it further and not necessarily offering commitment.

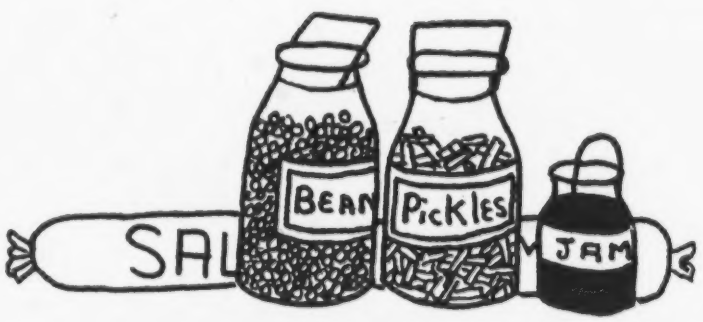
LIMITATIONS By selecting one alternative too quickly, you may pass up other, potentially fruitful ones. You must make selections in order to solve any problem, so the question is one of timing and the choice of other strategies to help you in the selection process.

EXERCISE - DETERMINISM This is a fairly simple exercise, but one that is often neglected in day to day life. Make a list of your long term goals. Include all types of goals, including social, business and economic ones. When you have your list completed, spend some time reviewing it, and then select the goal that you would most like to realize and to work towards. Continue to note each goal and its priorities. Review the list again. Have you been devoting more effort to your most important goals? Were you aware that you had selected priorities for these goals before? Does conscious selection help you to organize your agenda?

STRATEGIES FOR DEALING WITH THE FUTURE

This set explores various ways of preparing for and dealing with the future. Planning makes decisions in the present about future actions. Predicting projects past experience to foretell future events. Assuming freezes issues in order to be able to advance conceptually into the future. Questioning re-opens issues in order to protect against faulty decisions. Hypothesizing develops concepts in order to deal with the future. Guessing uses past experience subconsciously to deal with the future or the unexpected. Defining sets limits on future actions, and symbolizing prepares for manipulation of concepts in the future. Simulating makes models to predict the future, and testing makes change in order to get more meaningful feedback.

PLAN



POWERS To plan is to make decisions in the present about future actions. Planning is critical in situations where there is a limitation on time, money, energy or some other resource, or where the cost of failure is very high. Planning is a way of increasing the possibility or likelihood of realizing what we want.

LIMITATIONS Planning may prove detrimental in situations with many uncontrollable variables. In such a situation, planning would waste time and increase rigidity. Too much planning can kill spontaneous reaction. Planning can also set expectations which may be unrealistic and which may lead to unnecessary disappointment.

EXERCISE - HINDSIGHT Review and record some of the more memorable plans from your past (i.e., your plans when you were seven years old, your travel plans, your marital plans). Now check and see how many of your plans were realized. Concentrate on those that weren't, and try to determine why. Make a list of the various reasons for an unsuccessful plan. Could this list help you to construct more trustworthy plans in the future?

PREDICT

POWERS Predict transforms whatever material is available about the past and present into a model of the future. It creates new material from old, and constructs a hypothetical situation that has some probability of being realized. Predicting, like planning, is really a survival strategy and allows the organism to learn and grow from experience.

LIMITATIONS Expectations greatly influence present actions. You may act to make your predictions be realized, and this can be harmful if you are making negative or pessimistic predictions. It's often better to avoid a prediction, especially when it is emotionally charged and can affect your own actions.

EXERCISE - FUTURE SHOCKS Write a brief paragraph describing yourself ten years from now. Commit yourself to a fairly definite prediction. How much money will you have? Where will you be living? How healthy will you be? When you have carefully considered and recorded your prediction, try to determine how your predictions of the future are affecting your present actions. What would you have to do to realize your prediction? What would you have to do to change it?

ASSUME

POWERS It is impossible to take any action without certain implicit and explicit assumptions. As a strategy, assuming accepts the state of the problem as it exists and proceeds to other strategies. The power of assuming lies in increased speed. It hurdles momentary questions and uncertainty in order to explore other avenues of search.

LIMITATIONS You may take things for granted that are not true or feasible. We often build elaborate plans based on faulty assumptions, thereby affecting the validity of the plan itself. Assumptions also tend to close off avenues of exploration and limit our scope of action. We must be careful to test and question assumptions to avoid mistakes and misunderstandings.

EXERCISE - FOR SURE You probably make many more assumptions than you are aware of. To test yourself, make a list of a few close friends. Beside their names, record something that you have assumed about them but never questioned. These need not be major assumptions. When you have finished, call your friends and check your assumptions. Were most of them correct? Why hadn't you questioned them before? How do assumptions affect your view of people or situations?

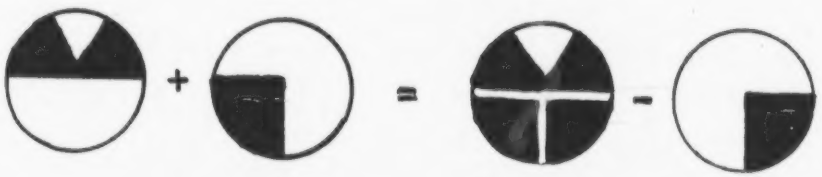
QUESTION

POWERS To question is to challenge the validity of a point in order to investigate a new line of reasoning. If you abide by assumptions and accept the status quo, you will overlook opportunities for change and growth. If you seriously question what you are doing, you are less likely to fall into ruts or fixations. Questioning is a disruptive strategy in the sense that it wants to make change or simply wants to play devil's advocate in order to explore an issue.

LIMITATIONS The limitations of questioning are excess and inappropriateness of timing. It is easy to have questioning take on a negative aspect. Also, there is a danger in overloading the mind with questions and trying to answer them all at once. It is usually a good idea to deal with one issue at a time, and misdirected questioning can interfere with this activity.

EXERCISE - SAYS WHO? This exercise can serve to demonstrate how the questions you ask influence the information you receive. Take any front page column from the daily paper. What questions does the column answer? Are there some important questions which have not been asked? Who wrote the column? Who owns the newspaper? What group does it represent?

HYPOTHESIZE



POWERS Hypothesize integrates existing information to form an explanation of why things happen or should happen. It provides a conceptual model which can form a basis to test future actions. It attempts to provide an explanation about how a system works before making change on the system itself.

LIMITATIONS Hypothesizing is time consuming and can inhibit spontaneous and intuitive action. Faulty hypothesis can obviously influence our actions and can be very hard to reject. It can be a good strategy to resist in order to keep one's mind open. Also, too much hypothesizing can be an excuse for not testing your hypothesis with action.

EXERCISE - ECOLOGICAL ESTIMATE How much polluting do you think is going on in your town or in your city? Make a list of what you think are major polluting factors and assign them priorities. When you have finished, test your hypothesis by contacting the nearest ecology or pollution control center. How accurate was your hypothesis? What did you base it on? How often do you test other theories you have?

GUESS

POWERS Guessing is spontaneous and intuitive and makes use of what the subconscious or preconscious seems to dictate. Guessing may be the most immediate way to react to a situation. Our guesses are greatly influenced by our past experiences. It is a good strategy to use if speed is more critical than an incorrect answer. It is also a good way to make a first pass at a problem in order to get meaningful feedback.

LIMITATIONS Many problems cannot be resolved on the basis of intuition or superficial evidence. Moreover, a great many of the problems we deal with are too important or critical to be handled with guesses.

EXERCISE - GUESS WHAT The next few times someone says, 'Guess what!', or, 'You'll never guess what just happened!' surprise them by actually guessing. Try and make a good guess, and keep a record to see how reliable your guesses generally are.

DEFINE

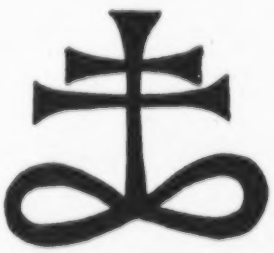
POWERS Defining focuses attention and delineates the problem or solution space. Many problems are solved in the definition stage, because inherent in each definition of a problem lies a definition of potential solutions to that problem. Defining is also an important strategy for clearing up misunderstandings and for insuring that people are talking about the same thing.

LIMITATIONS Premature definitions tend to cause rigidity in thinking. You must be careful to test each definition to insure that it is not overly restrictive. Many fixations are the result of inflexible definitions.

EXERCISE - STUDY WAR A LITTLE MORE Many heated discussions centered on war and violence take place today. This exercise will help you to define your terms, and by defining them, may clarify your views. Take a piece of paper and write your definition of 'war'. Try and make it as complete as possible. Question others about their definitions. Does a clearer definition affect your ideas about war?

SYMBOLIZE

POWERS Anything that represents something else is a symbol, and so symbolizing converts from one form of representation to another. The basic power of symbolizing is that it translates a statement of a problem into a more easily manipulated form. Symbols can represent feelings, associations and abstract concepts. It can also be used to express thoughts indirectly and to avoid explicit statements.

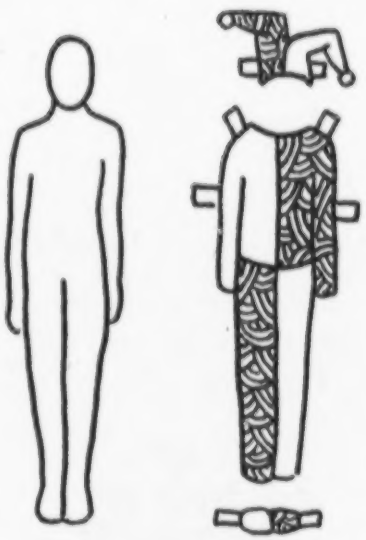


LIMITATIONS It is easy to form idealized relationships between symbols and to forget their reference points. A poor choice of symbols can mislead or overlook certain factors. Symbols can also be misused socially.

EXERCISE - SCAVENGER HUNT The following exercise is a symbolic scavenger hunt. Take as much time as you need, and search for: a tension reliever, a tension producer, a symbol of rebellion, a symbol of love, a symbol of hate, and a symbol of power. This exercise is most effective in a group, where you can discuss your different symbols. Are your symbols easily interpreted? Try them out on others and get feedback. What constitutes an effective symbol?

SIMULATE

POWERS Simulate allows you to represent a real situation by using a model, thereby avoiding the implications and difficulties of dealing with reality. When action is impossible or extremely costly, a model allows you to make trials and errors without risk. Simulation also is a powerful strategy for predicting and avoiding future situations. Simulation also offers new ways of looking at reality, and can expose you to different points of view.



LIMITATIONS Simulations only represent certain variables of the real problem. In a situation that is random and unpredictable, simulation may be difficult or deceptive. Finally, after simulation you may enter the real problem situation with such preconceptions and with such a rigid set of plans that you will react too inflexibly to changes in the problem state.

EXERCISE - SMOKING SIMULATION Some simulations can be quite dramatic in their predictions. The following exercise is a simulation of what can happen to a cigarette smoker's lungs. If you do not smoke, ask someone who does to help you. Inhale cigarette smoke, and then exhale with a tissue stretched across your mouth. There is a clear indication of residue left. By simulating, you are able to infer the eventual damage to lungs. Can you think of other situations in your life where simulation could help you to predict and avoid undesirable results?

TEST

POWERS Testing is critical to the evaluation phase in problem solving. Testing as a strategy involves making a trial run, and then relating the results to your expectations. Testing introduces change to explore the variables of a situation. The power of testing is that it adds new input to the problem solving process.

LIMITATIONS The changes that you must make upon a problem situation during testing may have destructive side effects. It is possible to test too early, or to destroy something in the process of testing. If your test is not carefully designed, the results may be misleading. Also, any kind of testing is an interruption in the development of an idea.

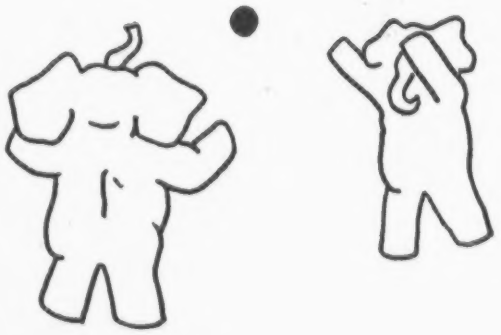
EXERCISE - DONALD + GERALD = ROBERT This is a difficult exercise which relies heavily on testing for a solution. Each letter in the addition problem represents a different number, and D = 5. Try and determine what number value the other letters have. All numbers from 0 - 9 are used, each representing one letter. Where a letter occurs twice, it represents the same number in each case.

STRATEGIES FOR PHYSICAL MANIPULATION

The following strategies all involve making some easily discernable changes on the problem state. While they are not limited to the physical world, each has clear physical implications. Play and manipulate are perhaps the most general of the manipulation strategies. Play makes changes on the problem state without conscious intervention, while manipulate purposely makes change. The next four strategies make a distinction between internal structural changes and external changes in the problem state. Copy is to simply reproduce. To interpret is to interject yourself into the communication process. To transform is to make internal structural changes and to translate involves changes of medium. The next four strategies create a spectrum from the small and simple to the very large and complex. Expand takes an initial state and elaborates upon it, while reduce moves towards simplicity. Exaggerate expands to the extreme, and understate reduces to the extreme. The last four strategies concern changes that can be made in the face of new problems and variables. Adapt makes small internal changes, while substitute replaces one factor with another. Combine unites two entities, and separate breaks down a complex structure.

PLAY

POWERS Play allows you to freely explore a situation without any conscious intention. Playing reduces the importance of success when taking action or making change. It is a way to get outside of the emotions and fixations of a situation. Playing also opens up a situation to chance happenings.



LIMITATIONS There is less of a guarantee with the strategy of playing than with most other strategies. Playing leaves you with a set of unconnected activities or trials. Finally, play can become an excuse for lack of concentration and effort.

EXERCISE - THREE BOTTLE PROBLEM This exercise can involve testing, hypothesizing, etc., but try to focus on playing as your major strategy. Place three bottles upright on the floor. Position them so that each bottle forms the corner point of a triangle of equal sides. The distance between the bases of any two bottles should be slightly more than the length of a knife. Using no more than four knives, construct a platform on top of the bottles. No part of any knife should touch the ground. The platform must be strong enough to support a full glass of water. Do you gain new insights while you're playing? Check your observations as you proceed with the problem.

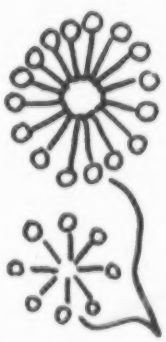
MANIPULATE

POWERS Manipulation is a strategy for structuring and restructuring compositions. You can test different kinds of spatial and functional relationships by manipulating elements you feel might work in a solution. Also, if you can make the elements which you are manipulating independent of each other, then you can make changes in one element without disturbing the whole structure.

LIMITATIONS Structural changes may not be enough to solve the problem. Sometimes new elements are necessary, or drastic restructuring is required. Also, manipulation is executed with conscious intent, and its success is dependent upon the limitations you have set for yourself. It may be helpful to alternate this strategy with a freer, more fanciful one.

EXERCISE - TOWER OF PULP This exercise requires large sheets of paper and scotch tape. Construct the tallest tower you can in thirty minutes. You may cut, fold, or form these materials any way you like. Be aware of the manipulations you make as you progress through the problem.

COPY



POWERS As a strategy, copying reproduces as accurately as possible, a previous event or object. No change or personal bias intrudes. Copying can serve as a safety strategy. If you make changes on the copy, the original has not been lost or damaged. Because the effect of copying is to lengthen or insure the life of the original, copying is a good strategy to remove the fear of failure.

LIMITATIONS Copying is a rigid strategy that produces nothing new. It can be an excuse for not thinking for yourself or failing to look at the situation from a fresh point of view. Copying is generally a preparational strategy and should rarely be considered as an end in itself.

EXERCISE - ARTISTIC ASSEMBLY You are going to execute an original work of art by copying. Using tracing paper, copy sections of illustrations that you like; an arm, a tree, a leg, etc. When you have finished your file of copies, review them and decide on a combination. Take a fresh piece of paper for your combined picture, and copy the various sections you want included in any arrangement you like. If you make any mistakes, you should attempt another composition, using your original file of copies.

INTERPRET

POWERS Interpreting is transforming an original concept or composition into your own terms. The power of interpreting lies mainly in the fields of education and communication. When you have interpreted something, you have assimilated it and added something of yourself. Thus, use of this strategy forces understanding and personalization. In the world of communication, interpreting a complicated concept can help make it meaningful to a particular audience.

LIMITATIONS Interpreting may highly bias and mislead other people. You must be clear about your intentions when you interpret information or ideas.

EXERCISE - CHARADES This game cycles through all the communication strategies, but will be used to focus on interpret in this exercise. Gather a group of people and play charades. Be aware of the processes you go through when you interpret a book or song title into non-verbal movement. Do any misunderstandings or misinterpretations occur? Why?

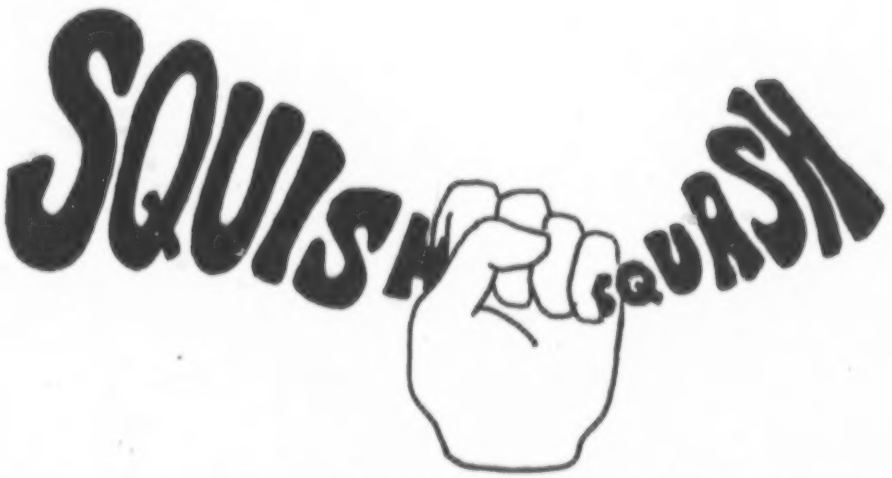
TRANSFORM

POWERS Transform changes composition or structure. All strategies make change, and thus can be seen as stages of transformation. Change in the structure of a situation can make what was once an unacceptable solution an effective one. Once you adopt this strategy, you must refer to your own process repertoire of specific strategies to evaluate their appropriateness.

LIMITATIONS Many structural transformations are irreversible. It is always wise to make your transformations on a copy first. Also, a complete departure may be a better strategy than trying to restructure what is basically unworkable.

EXERCISE - GOOD NEWS Once again you will use a daily paper for your reference point. Pick out an article or a piece of news that displeases you. Carefully review the article, and record what factors or situations must be transformed to make the news acceptable to you. How difficult is it to decide what specific elements must be changed? Once you have your list, decide how you would transform the points you chose.

TRANSLATE



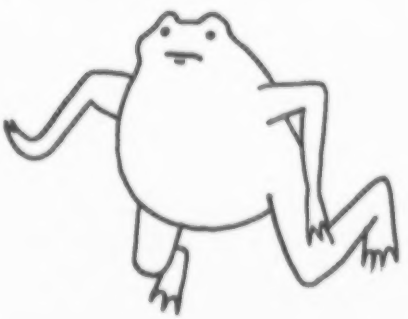
POWERS The way you perceive things is greatly affected by the medium in which they are presented. Often the solution to your problem is simply to express the same concept or idea in slightly different terms. Thus, translating from one medium to another is a very important strategy for changing your own point of view with respect to a problem, and for making the information you work with more accessible and compatible with certain kinds of changes.

LIMITATIONS If translating changes the expression of a concept, it may well affect the way the concept is received by someone else. People may be misled, and believe that because something is expressed in different terms, it is actually different.

EXERCISE - ELEMENTARY How well do you understand your own political views? In this exercise, you will attempt to translate your views so that a child of six could understand them. You should record as you go along. Would visual communication be helpful? Can you translate complex ideas to a clear and simple level?

EXPAND

POWERS Expand includes enlarging and adding detail for some purpose. When you expand a part of an idea, you examine it in more detail. Expanding has the power of first developing the basic structure and then elaborating upon it. It is a useful developmental strategy. It may also serve as a testing strategy. You can judge whether a factor retains its meaning and relevancy when it is fully developed.



LIMITATIONS Expanding or elaborating on a rotten foundation may only be a waste of time. Expanding can be a good way to test the implications of a structure, but it is not a good way to examine the structure itself. It may be wise to defer this strategy until primary structural and conceptual issues have been resolved.

EXERCISE - WEEKEND What are you planning to do this weekend? Record your answer, and then expand on it. Go into full detail. Justify your planned activities. Explain their implications and ramifications. Does your plan make sense when it is expanded? Did your plans change while you were expanding? How does this exercise affect your perspective on the weekend?

REDUCE

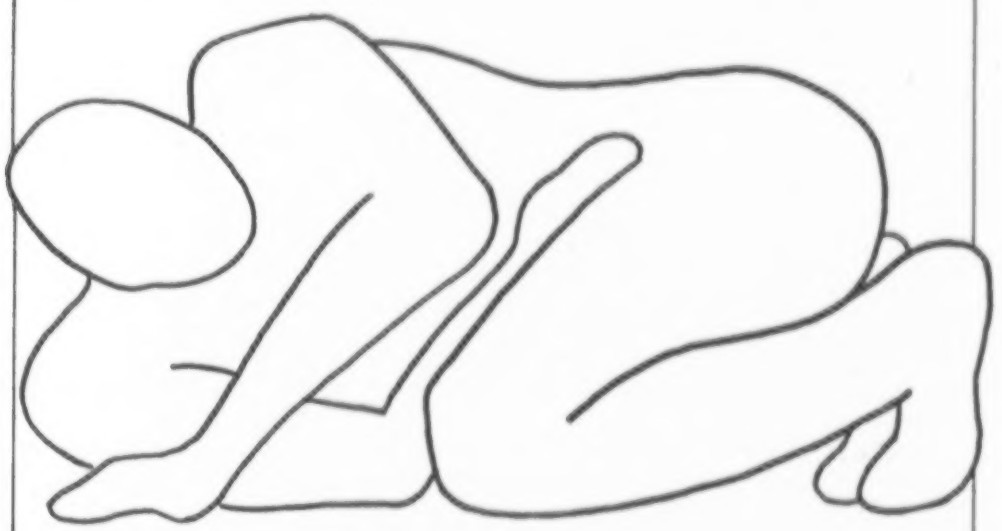
POWERS As a strategy, reducing contracts and simplifies a situation. Reducing a problem to simple concepts or elements is one of the most powerful strategies in problem solving. Reducing is also a learning strategy. Reducing ideas and facts to key ideas aids the memorization and recall process. Reducing things in size can also give us a different, more objective perspective.

LIMITATIONS Detail and information are edited during reduction. There is always the problem of being overly simplistic, thereby losing meaning or relevance. What you reduce is critical if this strategy is going to work for you. Also, there is a danger of getting fixed in a simplistic situation. You must temper your use of this strategy to enable yourself to expand back to a more complicated level.

EXERCISE - COCKTAIL CHATTER Often you have to reduce your ideas and simplify them if you hope to get in a word at a group gathering. Have you ever reviewed those spontaneous reductions of yours? In this exercise, you can plan ahead for your next party. Express your views, allowing one sentence each, on the following subjects: the President, capitalism, sex, violence, ecology, urbanization, education. Review your one liners. Have you retained the basic idea you wanted to convey? How much was lost in the reduction?

EXAGGERATE

POWERS To exaggerate is to push a situation to its limits for some purpose. Exaggerating has one power as a strategy for testing. It is also a useful strategy for emphasizing in communication or in humor. Finally, it can serve as a good learning strategy. If you exaggerate the correct approach, the effect may prove more lasting.



LIMITATIONS Exaggerate is an extremely strong strategy, and may backfire. Exaggeration can lead to misunderstanding in communication. It can lead to boredom or disbelief if used too much. It can be destructive if applied to delicate situations and can distort your view of a problem if it is not counteracted by some other change.

EXERCISE - SUPERLATIVE Choose a day, or a part of a day, for exaggeration. Exaggerate everything within reason, including your reactions, emotions, etc. Note other people's feedback to this communication strategy. Is it familiar to you? In which situation did it prove most effective?

UNDERSTATE

POWERS Understate de-emphasizes and restrains. The power of understate has many of the attributes of exaggerate. Again, glaring absence of something can have as much impact as too much. Like exaggerate, understate can serve as a strategy for humor, testing and communication.

LIMITATIONS The limitations of understate are similar to those of any action that pushes a state to the extreme. Understatement can lead to deception, misunderstanding, overemphasis and triteness if used inappropriately.

EXERCISE - IT'S NOTHING This exercise is just the reverse of the exaggerate exercise. Again, choose a day or part of a day and understate consistently. Analyze the feedback you get and the effectiveness of this strategy in various situations.

ADAPT

POWERS Adapting is a very powerful strategy because it changes what we already have into something that can meet the new conflict or crisis. Often adaptations are the most ingenious, effortless and novel solutions to a problem. The key to adapting is to break fixation and to see with a new perspective. Our ability to adapt and to adjust to new situations is critical to our survival in this world.

LIMITATIONS The major problem with adapting is that we may find ourselves forcing something to work rather than looking around for something that could do the job much more simply.

EXERCISE - ECOLOGICAL ADAPTATIONS Try and think of different ways to adapt a tin can for some other use. Force yourself to think up at least ten adaptations. They should be ideas which you can actually use. How difficult is this strategy for you? What else could you adapt?

SUBSTITUTE

POWERS As a strategy, you substitute one potential solution for a solution with higher potential. Often by replacing an element within a structure, the whole structure will appear different or perform in a better way. The power of substitution involves totally escaping the limitations of one alternative and replacing it with another.

LIMITATIONS In some situations it may be better to adapt something familiar to the system than to totally replace it with some outside entity. In many cases substituting can take a lot of time and energy. Also, if used too hastily, this strategy may not give your structure a chance to perform or to prove itself.

EXERCISE - IT'S ONLY MONEY Most people experience financial problems at some point in their life. What would you substitute for an economy based on money? Gold? Trade? Record your ideas. Check the feasibility of your idea by imagining yourself within your proposed economy. Could you survive? Adjust your plans until they can include you.

COMBINE

POWERS Combine brings parts or elements together in close relationship. Combine has the power of making a more complete and straonger whole out of several parts. It can be a strategy for saving time by combining two tasks into one. It is also a test strategy; combining two things and seeing how they relate or react. Finally, if you can combine two ideas into one, you may simplify the perceptual organization of your composition.

LIMITATIONS That two entities work well by themselves does not mean that they will work well together. You must constantly weigh the loss of identity and importance of combined elements against the value of the combination as a whole.

EXERCISE - CONSCIOUS COMBINATIONS Force for one day and try to combine as many things as possible. Don't go anywhere alone, add something new to a simple recipe, do the laundry while you're shopping, read while you're taking a bath, etc. How often do you usually manage to combine tasks or ideas? When and where is it an effective strategy for you?

SEPARATE

POWERS One of the important powers of separating as a strategy is simplification. Separating is also a good strategy for inhibiting certain reactions. Separating can be a strategy to prevent confusion and unnecessary and destructive interaction. Attempting to separate things from their context is an extremely important process in perception and identification.

LIMITATIONS When you break down a complex into its parts, often the qualities of it as a synthesized whole are lost. Separating can also be potentially self destructive in the sense that it can keep things from interacting. Finally, there are many ways to break down a complex whole, and the most obvious ways may not be the most useful or instructive.

EXERCISE - YOU ARE WHAT YOU EAT For your next meal, conduct a separation analysis. Make a list of all the separate ingredients, chemicals, spices, etc., that are included. How does your perspective on the meal change when you can see its separate elements?

META-HEURISTICS

84

The following strategies serve to control other strategies. The first four comprise a rather complete set of the different approaches we can take in a given situation. We can change from the use of one strategy or approach to another, or we can vary the one we're using now by making small internal changes within it. We can cycle back and forth between several different strategies, first attending to one, then another, or we can continue to repeat the same strategy over and over again. Furthermore, given any set of processes, we can systemize the way we execute them, or we can randomize our approach to them by following no plan or procedure.

Because these strategies are used to control and manipulate other strategies, it is not practical for us to offer an 'isolated' experience in each of them. Simply try to be aware, as you review the following pages, that you are constantly using these strategies in conjunction with other strategies you may be employing.

CHANGE

POWERS As a strategy, changing means trying a new strategy or a new approach. In many ways, change can be considered the most important strategy. Changing points of view and approaches is critical during any analysis stage of problem solving because it protects you from the limitations of a single point of view. You must constantly ask yourself whether the approach you are currently using is effective, or whether it would be wiser to change strategies and try something else.

LIMITATIONS Change may have disruptive side effects. You must devote a certain amount of time to a transition period when you are changing strategies. Often change brings the most dramatic rewards, but it may also prove destructive.

VARY

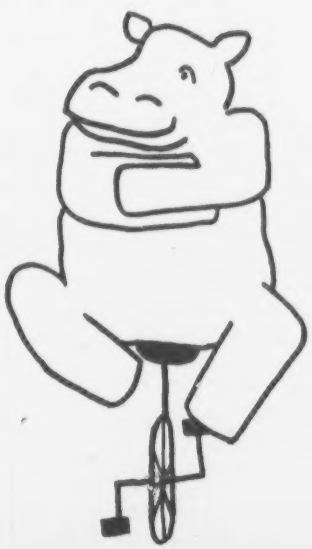
POWERS Vary is less dramatic than the strategy of change, and only involves small changes or alterations. In general, varying is a powerful strategy because it offers great rewards for very little effort. Varying lends continuity and consistency to the trial and error process and makes use of pre-existing structures.

LIMITATIONS Because varying makes small changes within a larger structure, its validity is dependent upon the validity of that structure. Varying also is very focused and short sighted. The success of varying as a strategy will depend on what you are varying and what strategies you have for guiding your variations.

CYCLE

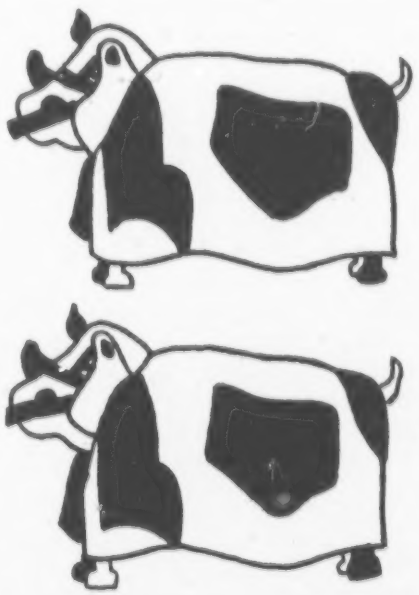
POWERS Cycling enables us to effectively carry on several different activities simultaneously. It involves moving between several different strategies or processes. Cycling protects us from getting trapped on one small sub-problem, or from working on one aspect of a problem in more detail than other aspects.

LIMITATIONS If you jump back and forth too quickly between approaches, you spend most of your time in transition and do not allocate much time to working with each process. There are many processes that take an initial amount of warm up time to become effective. It may be better to repeat a given approach several times before jumping on to another approach.



REPEAT

POWERS As a strategy, repeat involves trying the same process or strategy another time. the decision to repeat is one way of checking yourself. It is also an important strategy in learning and over learning as well as a strategy of emphasis and reinforcement. This strategy may offer the greatest gains with the least effort.



LIMITATIONS Needless repetition is one of the great enemies of innovation and creativity. The value of repeating as a strategy sharply decreases after the first few repetitions. Exact repetition relies on some external change for its success, and unless you have some strong indication that such a change is likely, the use of this strategy may prove fruitless.

SYSTEMIZE

POWERS To systemize is to externalize the decision making process and to develop a set of rules or procedures for governing actions. When you have established a system, less thought has to go into each step and the total process becomes quicker and more mechanical. The most common products of systemizing are what are known as habits. This can be a good strategy to use if you recognize some recurring elements in certain kinds of problems. By systemizing your approach to these problems, you may guarantee solutions and reduce the problems to trivial ones. Also, it is easier to teach someone else how to do something if you have established set procedures yourself.

LIMITATIONS Most open ended problems do not lend themselves to highly systematic procedures. A system also tends to be inflexible. It is very easy to get lulled into complacency by so systemizing what you do that you forget to think about it.

RANDOMIZE

POWERS This strategy removes all order or structure and simulates a random distribution. Randomize almost always makes use of some external mechanism to achieve its goal. Our culture is so oriented towards rationality that randomizing can often be a good antidote to the limitations of our logical thinking. It helps to remove bias and is a good way of breaking fixations.

LIMITATIONS It is difficult to consciously randomize, and if you succeed, it becomes risky to rely on random chance. Randomizing serves to unsettle you, but you must rely on other strategies to readjust yourself and to take advantage of your new position.

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TOOLS FOR CHANGE